

# **Climate change and the future of California's endemic flora**

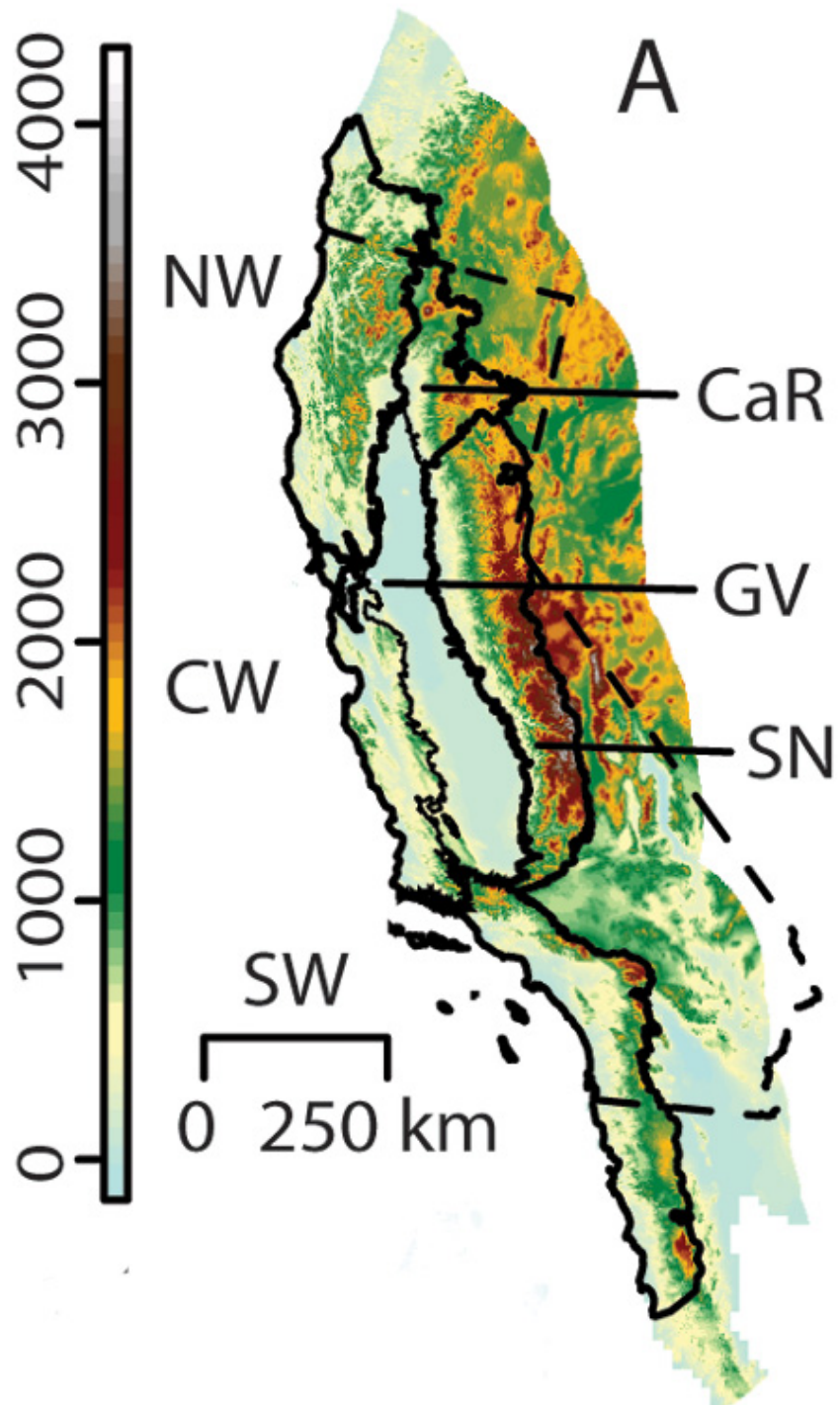
**Scott R. Loarie and David D. Ackerly**

**(B. Carter, K. Hayhoe, S. McMahon, C. Knight & R. Moe, PLoS ONE, 2008)**



photo by Scott Loarie

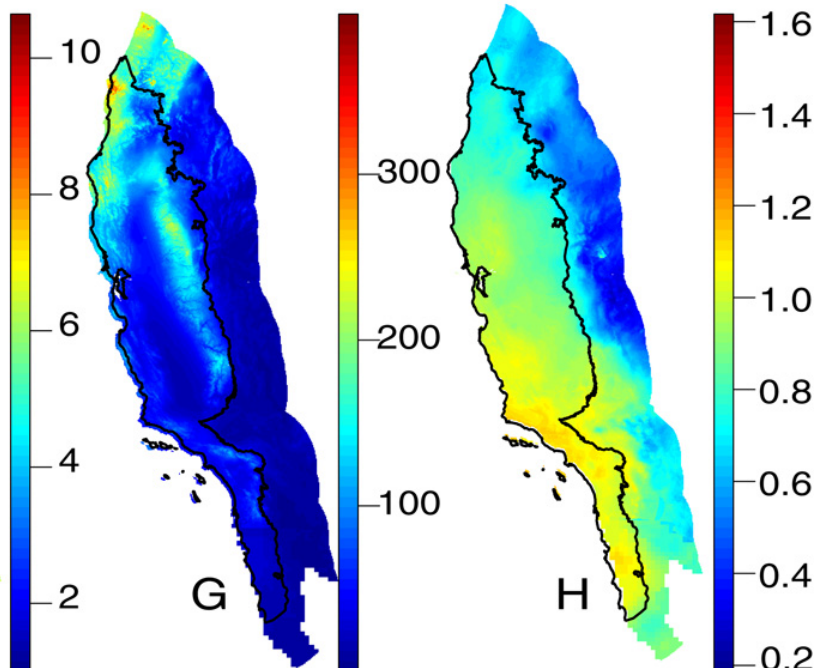
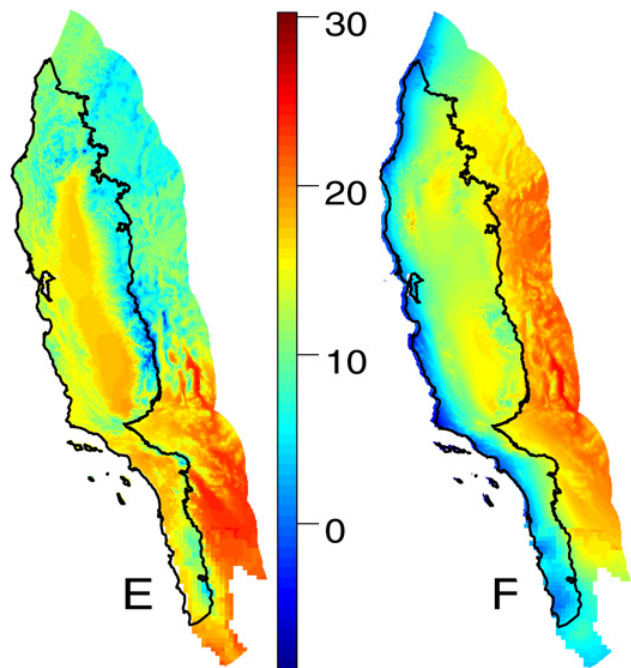
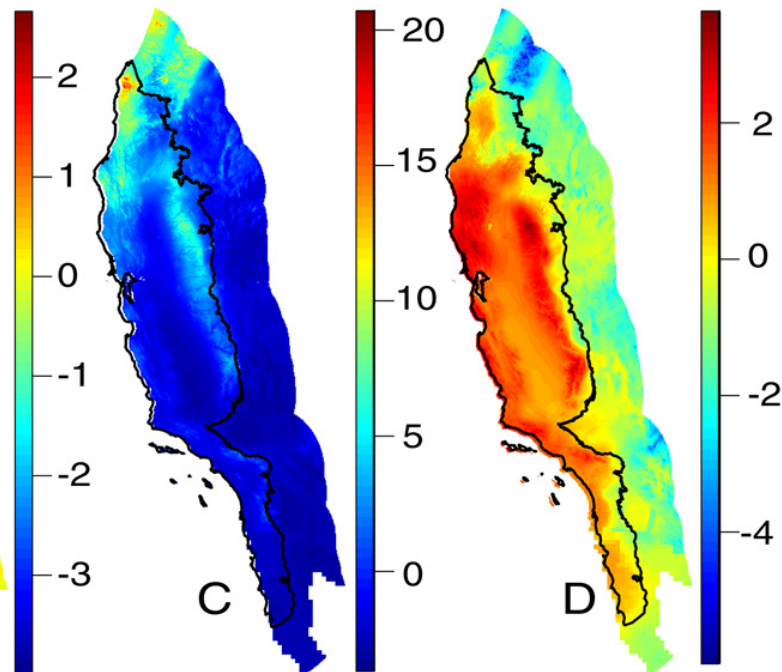
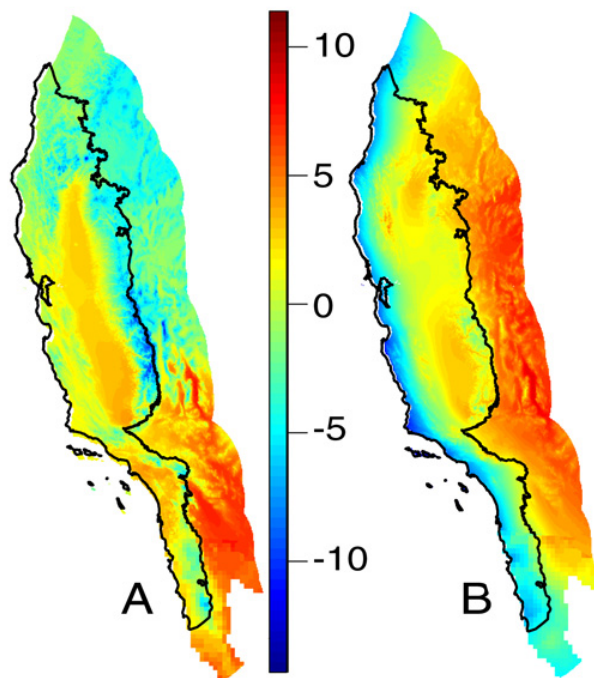




photos © 1998 California Academy of Sciences

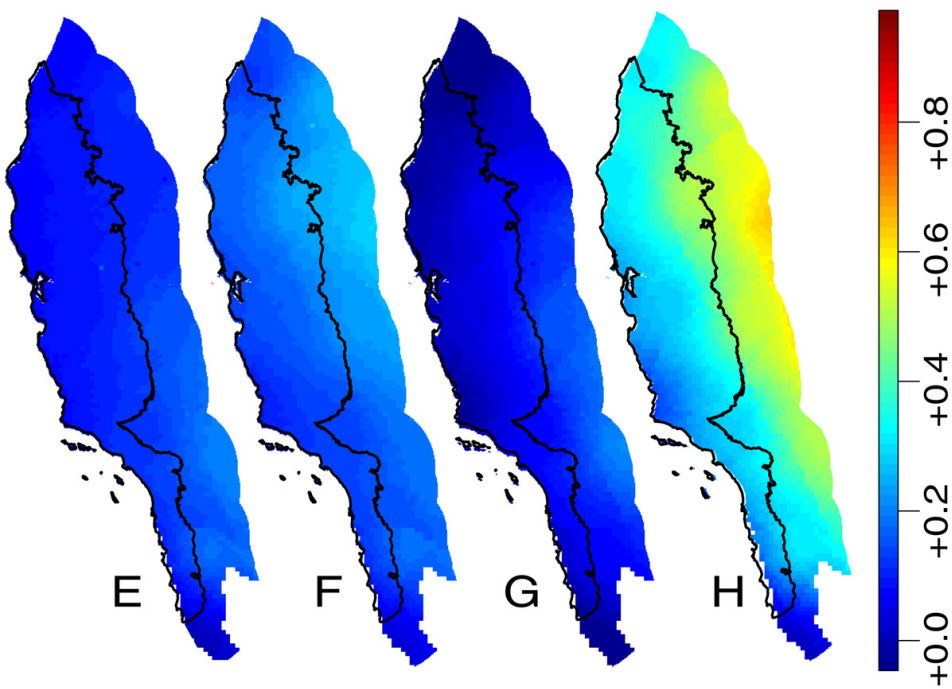
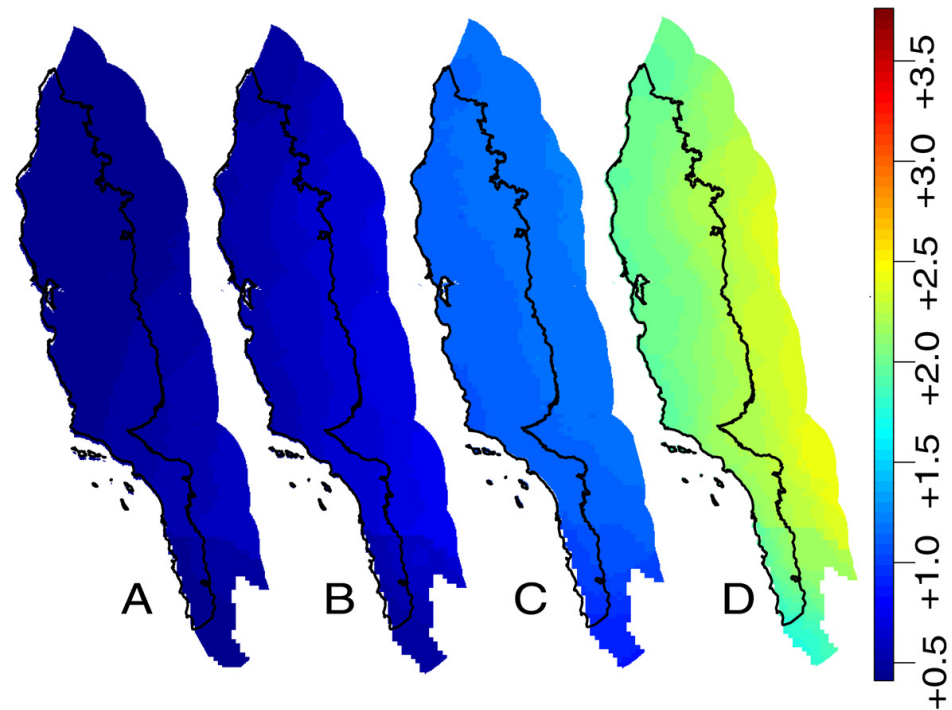
# Temperature

# Precipitation

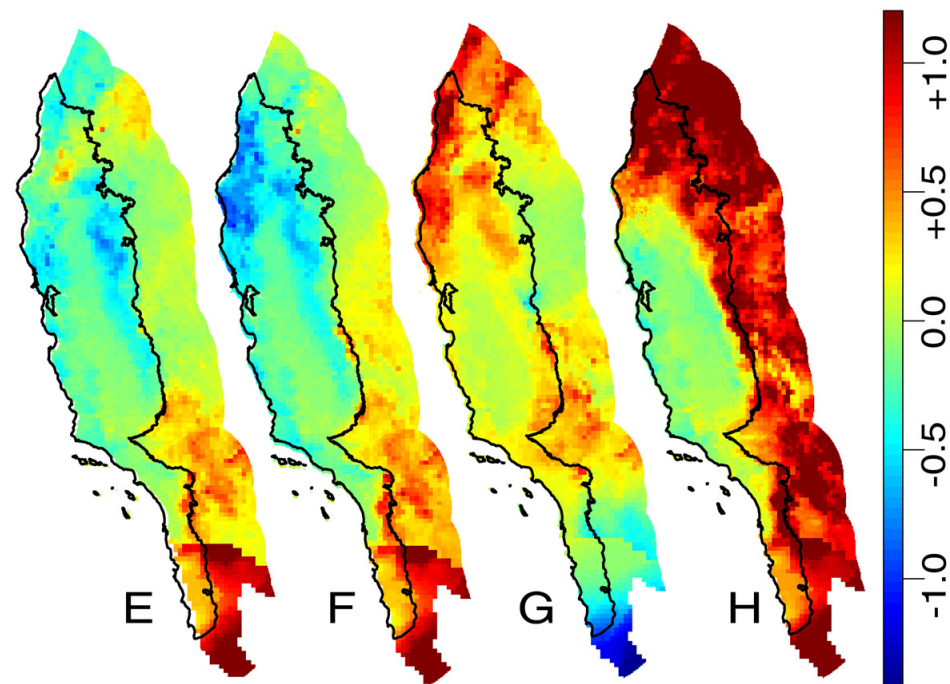
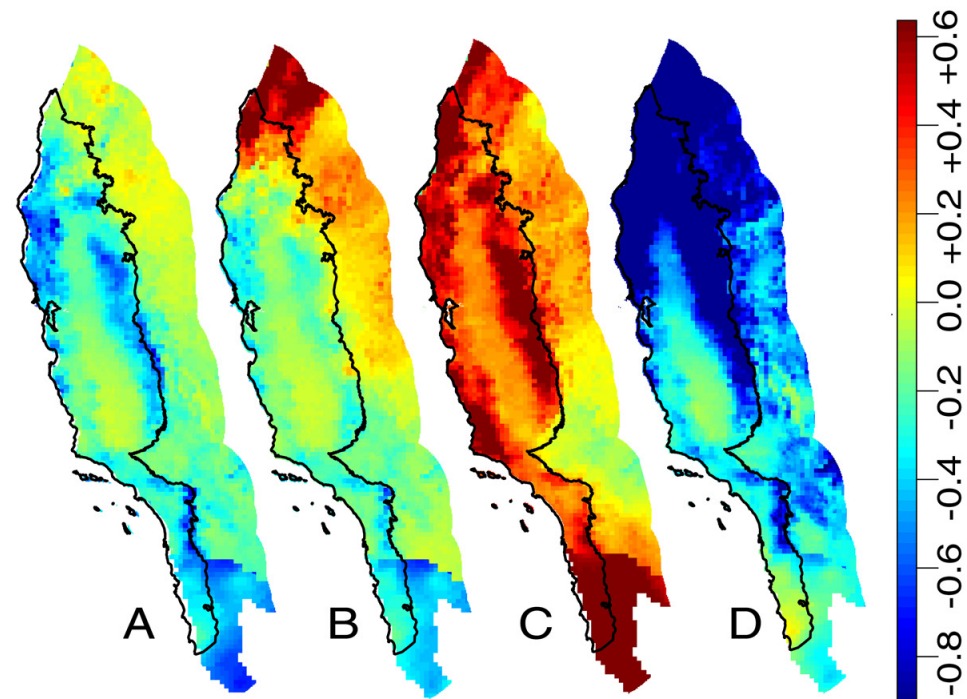


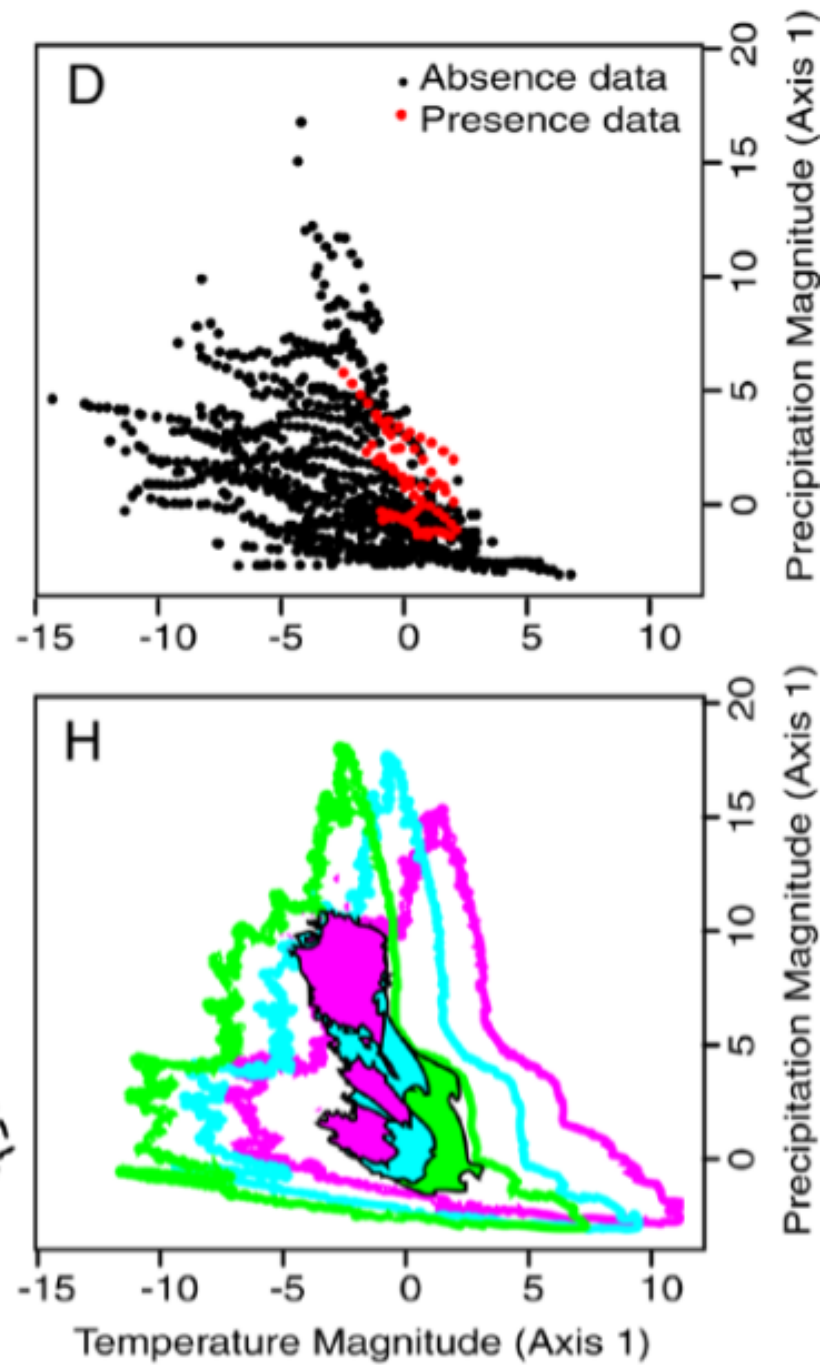
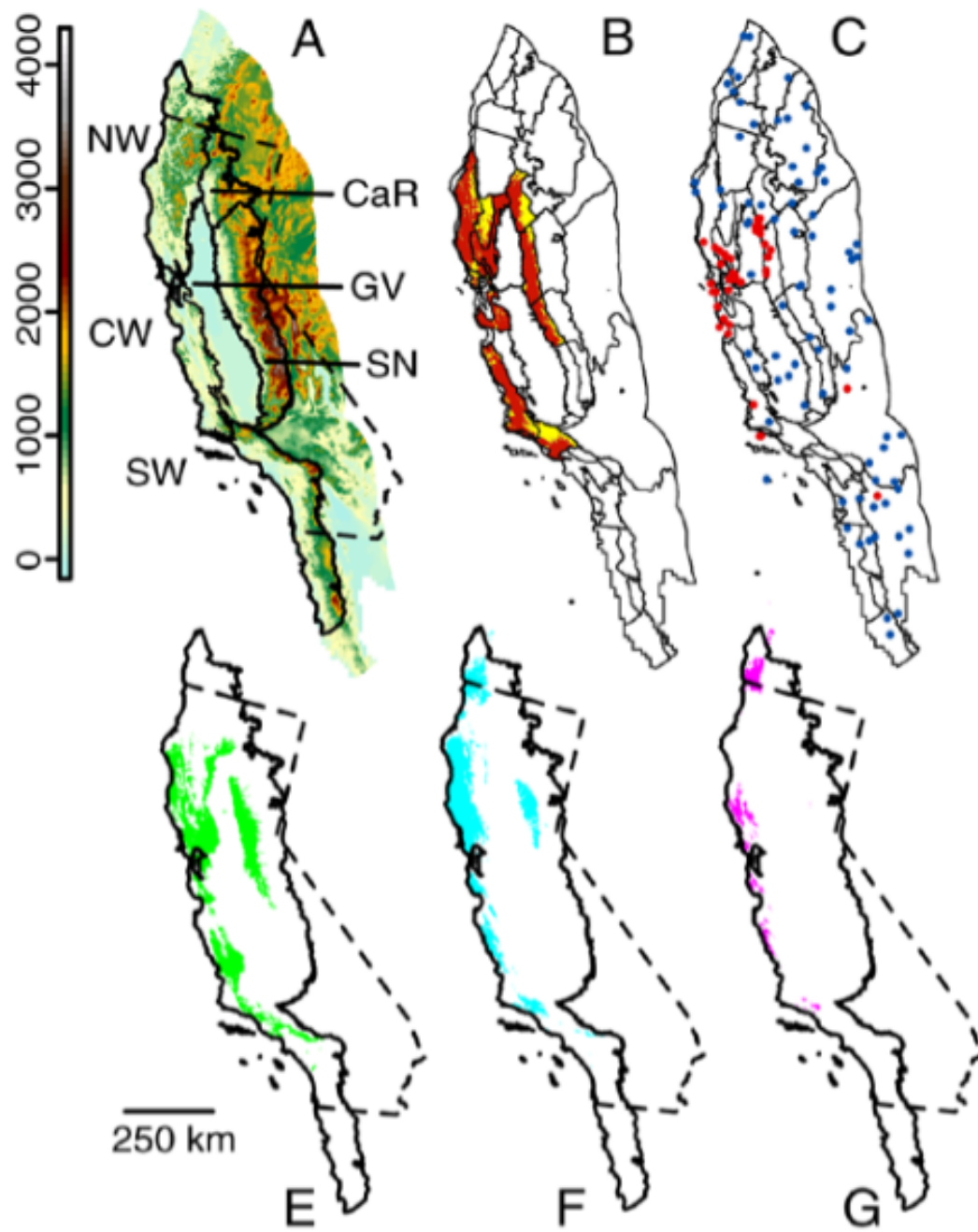


# Temperature



# Precipitation









# California Bay *Umbellularia californica*

Current Range

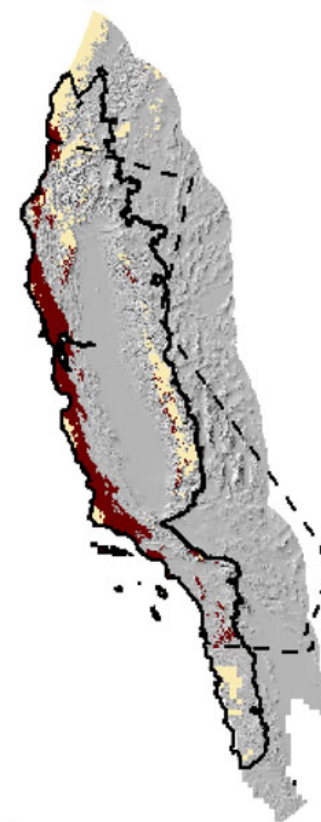
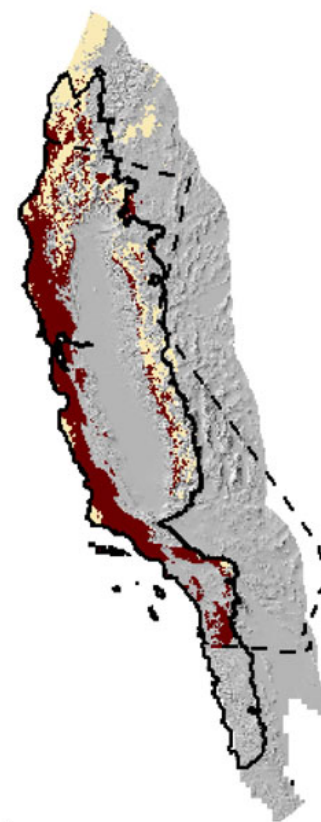
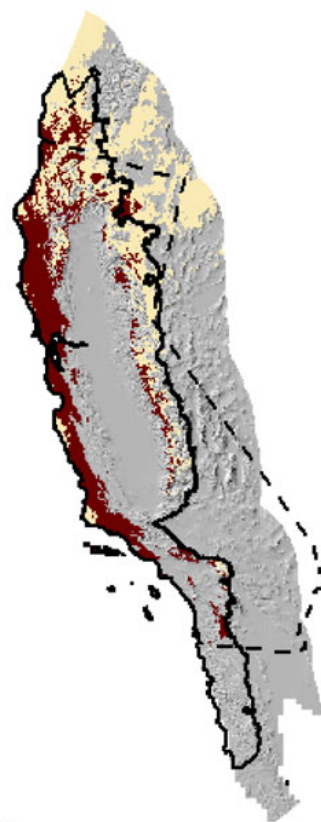
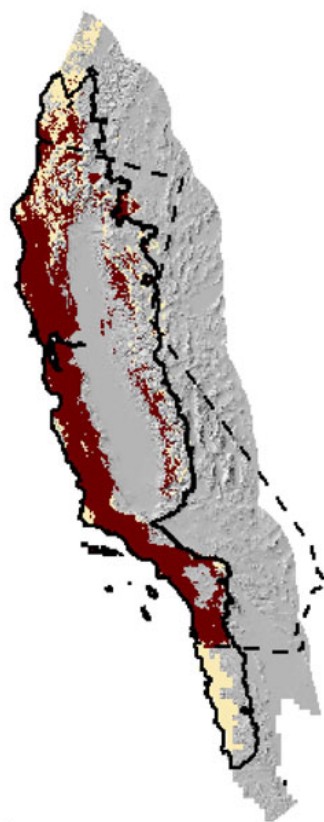
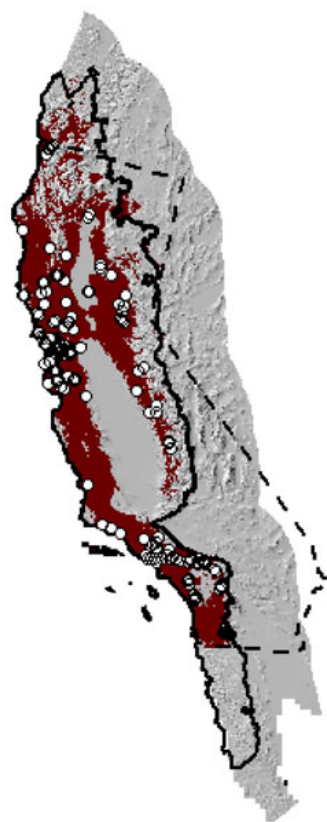
Less sensitive simulation  
Lower emissions

Less sensitive simulation  
Higher emissions

Future Range

More sensitive simulation  
Lower emissions

More sensitive simulation  
Higher emissions



■ Current range ○ Herbarium specimens

■ Future range

■ Future range (pending dispersal)





# California Toothwort *Cardamine californica* var. *sinuata*

## Future Range

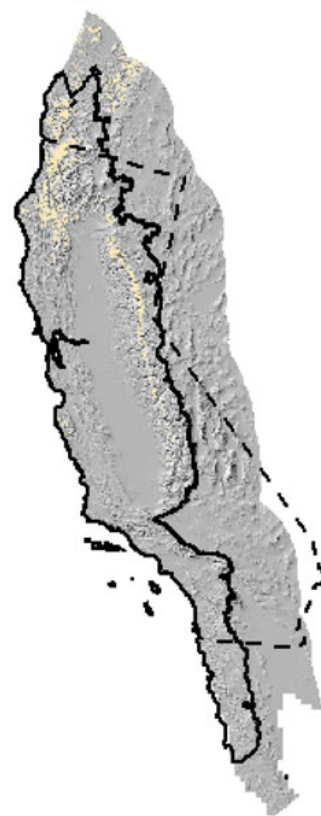
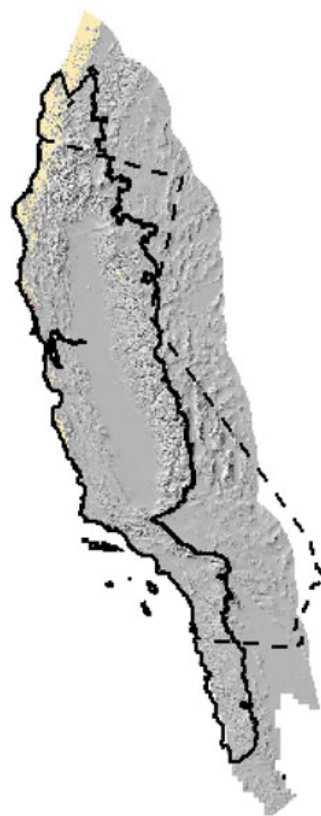
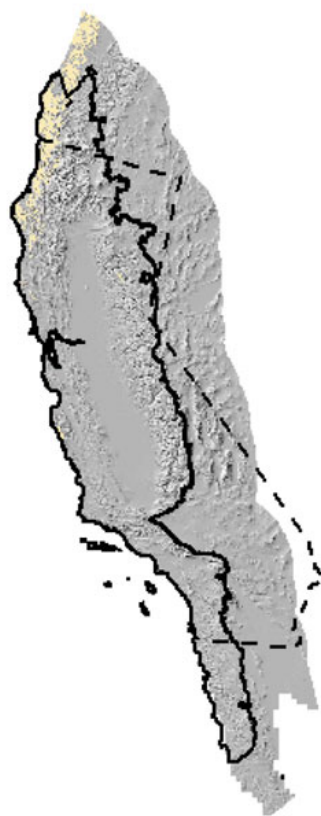
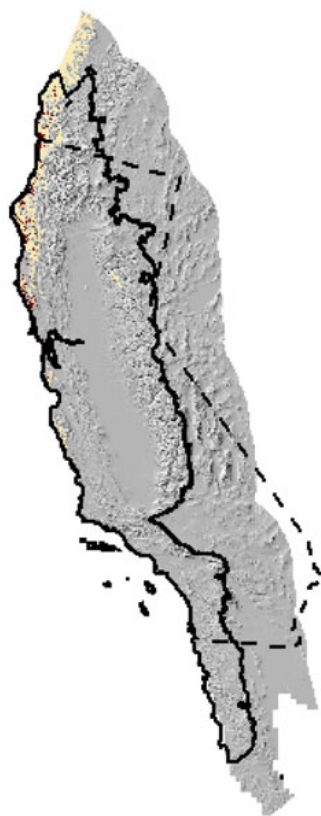
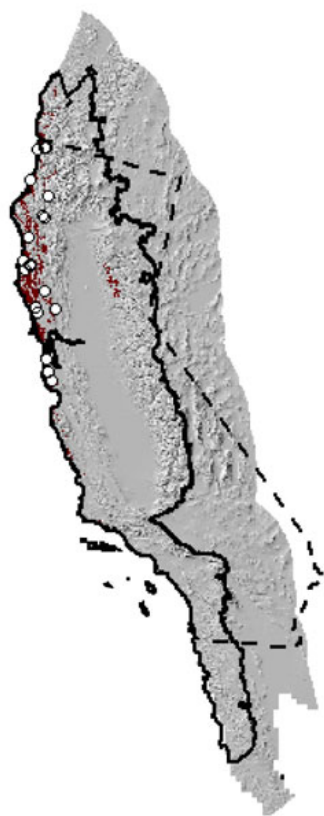
Current Range

Less sensitive simulation  
 Lower emissions

Less sensitive simulation  
 Higher emissions

More sensitive simulation  
 Lower emissions

More sensitive simulation  
 Higher emissions



■ Current range ○ Herbarium specimens

■ Future range

■ Future range (pending dispersal)



# Whiteleaf Manzanita

*Arctostaphylos viscida subsp. viscida*

## Future Range

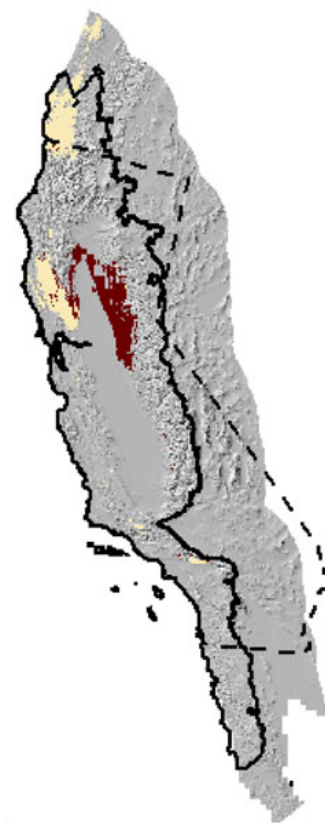
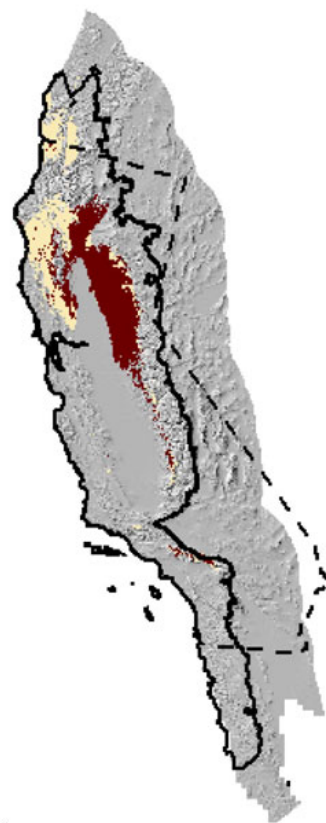
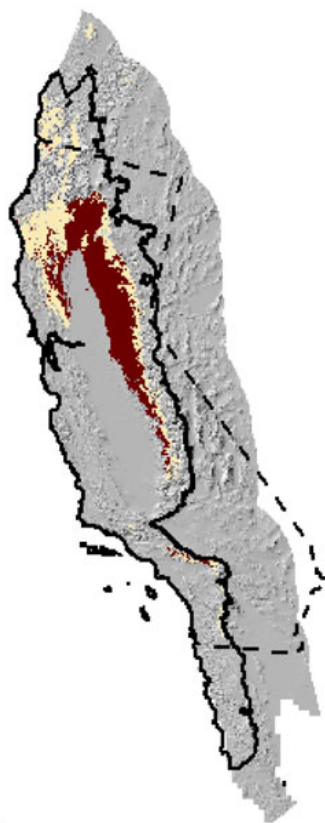
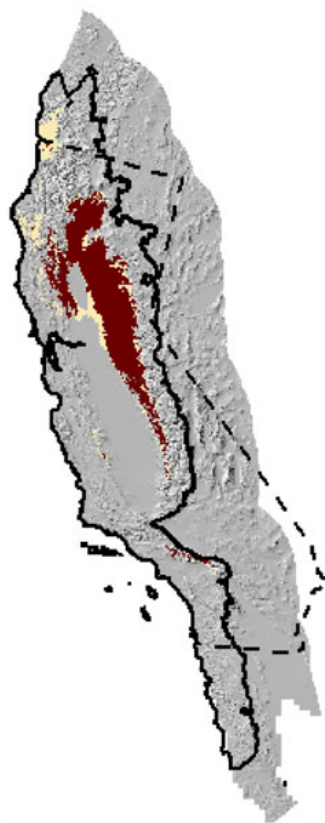
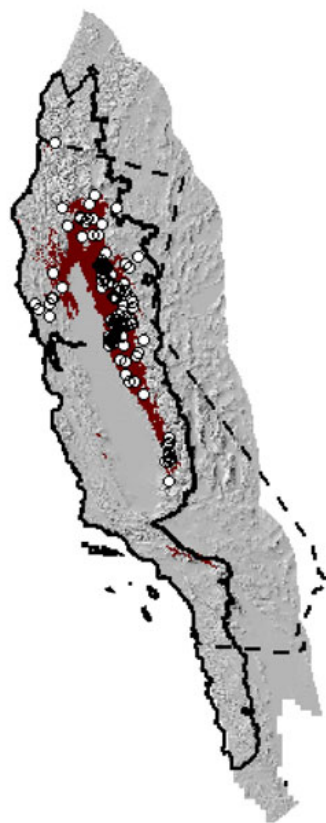
Current Range

Less sensitive simulation  
Lower emissions

Less sensitive simulation  
Higher emissions

More sensitive simulation  
Lower emissions

More sensitive simulation  
Higher emissions



■ Current range ○ Herbarium specimens

■ Future range

■ Future range (pending dispersal)





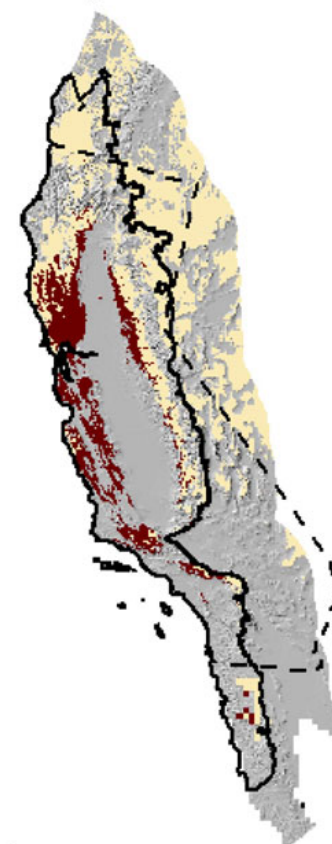
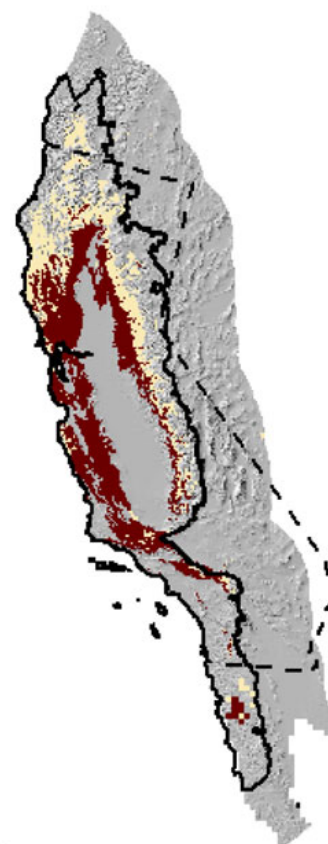
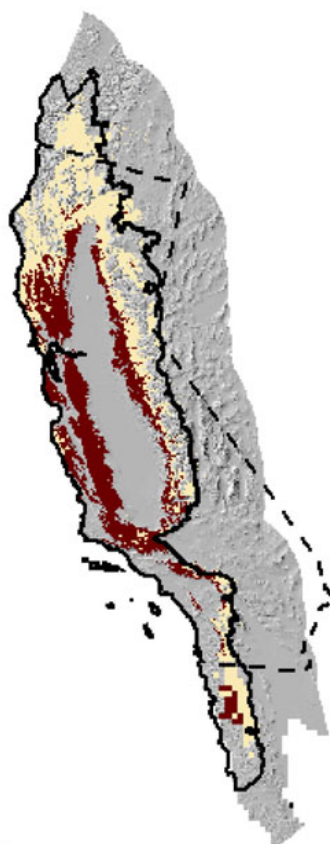
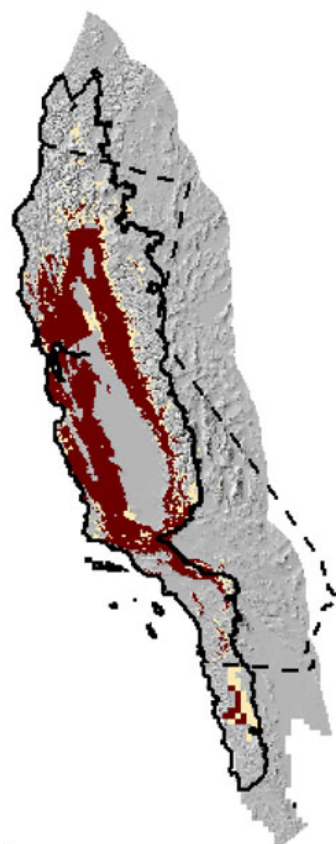
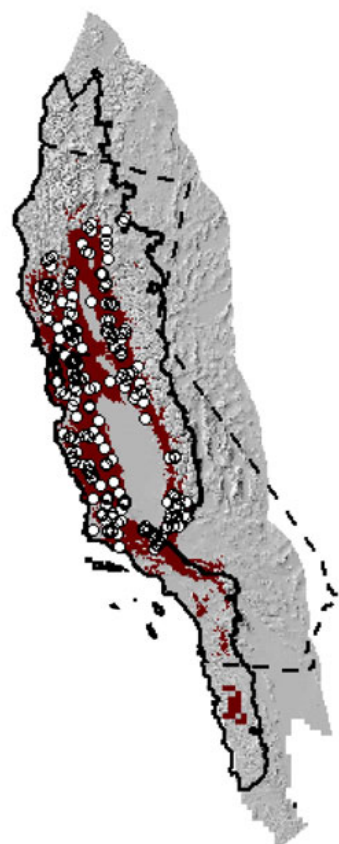
Blue Oak  
*Quercus douglasii*  
Current Range

Less sensitive simulation  
Lower emissions

Less sensitive simulation  
Higher emissions

More sensitive simulation  
Lower emissions

More sensitive simulation  
Higher emissions



■ Current range ○ Herbarium specimens

■ Future range

■ Future range (pending dispersal)





Kellogg's Monkeyflower  
*Mimulus kelloggii*

Future Range

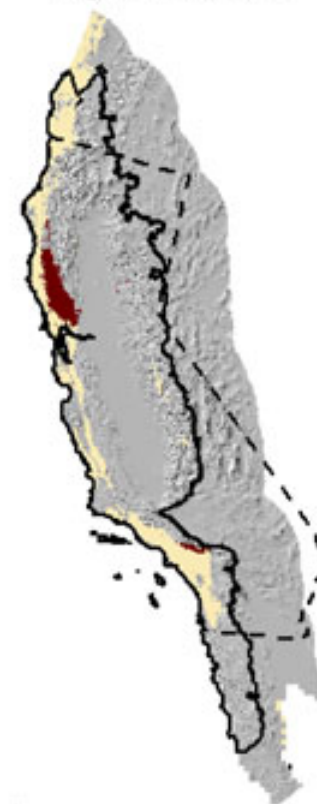
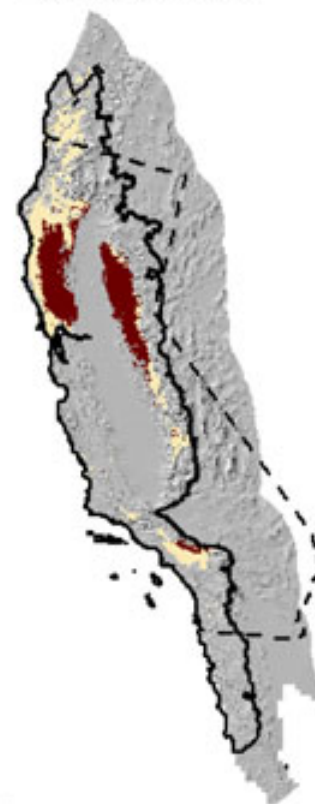
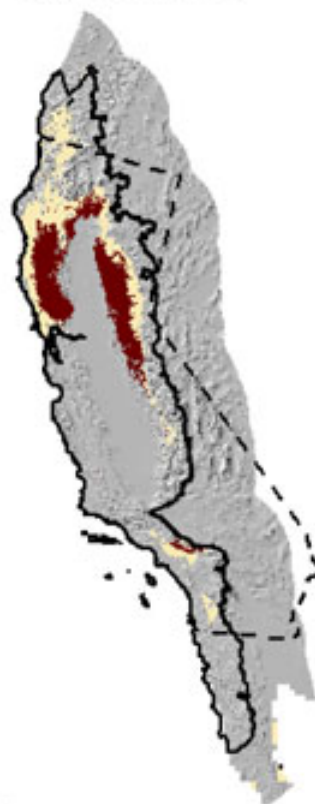
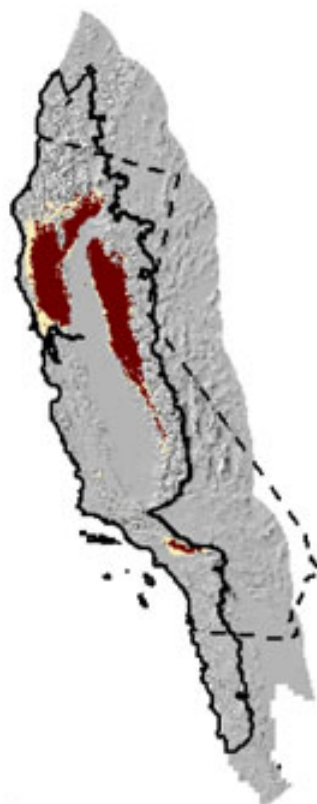
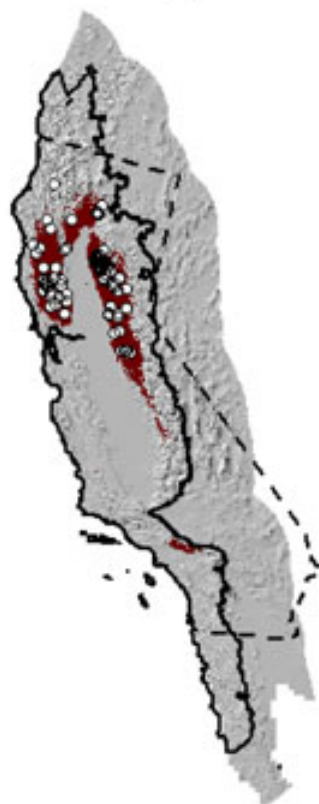
Current Range

Less sensitive simulation  
Lower emissions

Less sensitive simulation  
Higher emissions

More sensitive simulation  
Lower emissions

More sensitive simulation  
Higher emissions

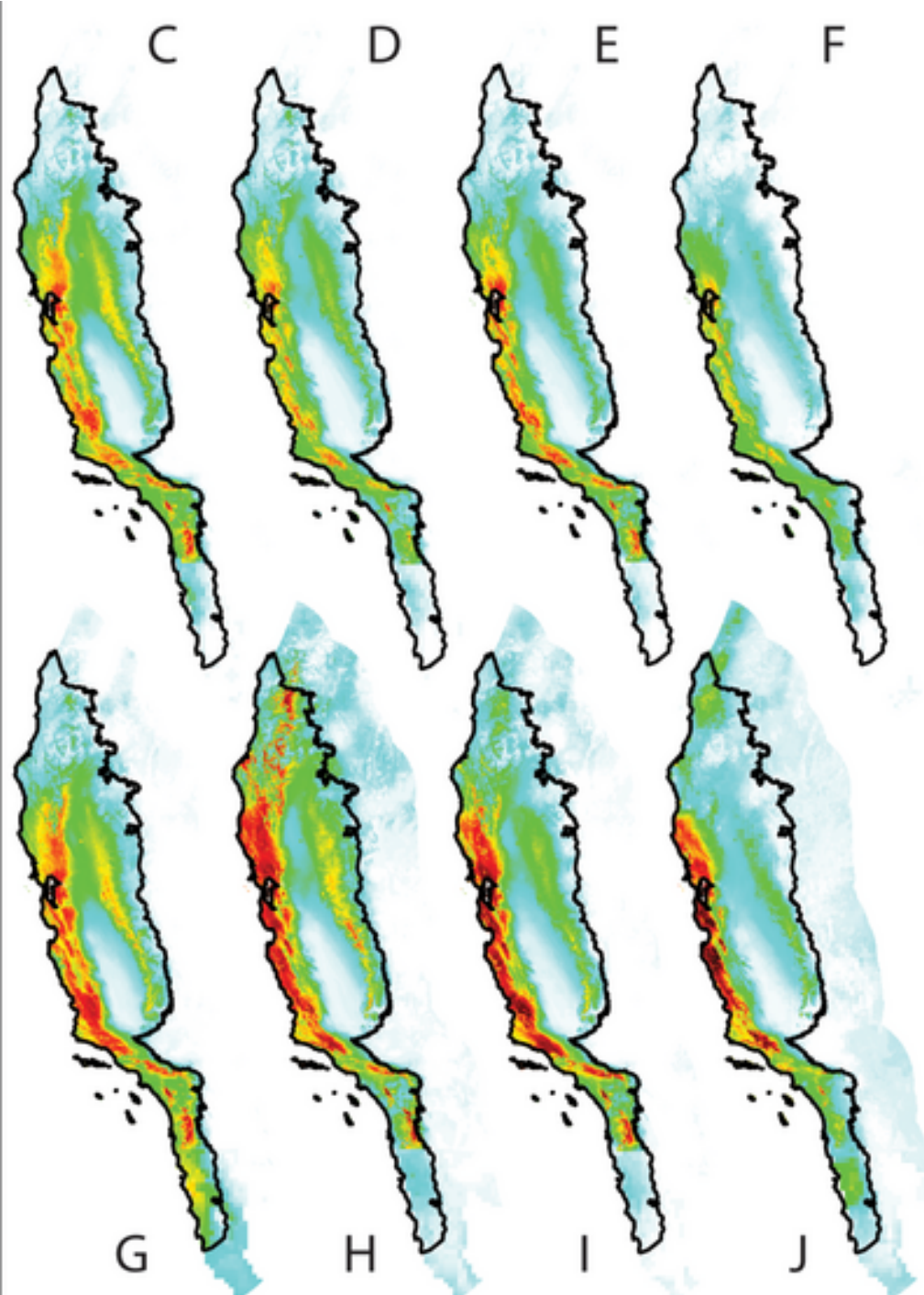
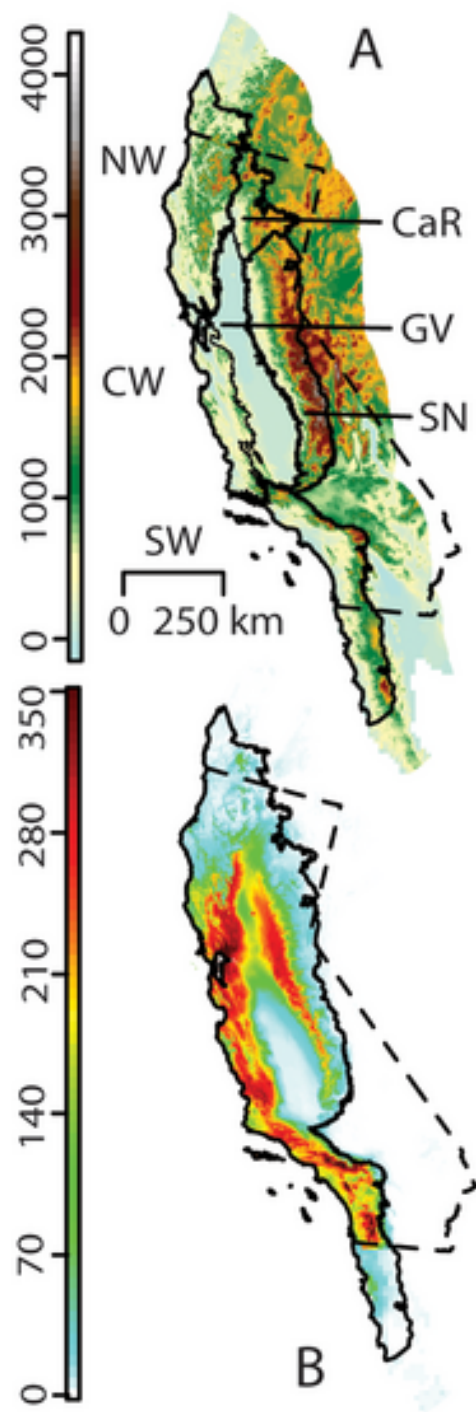


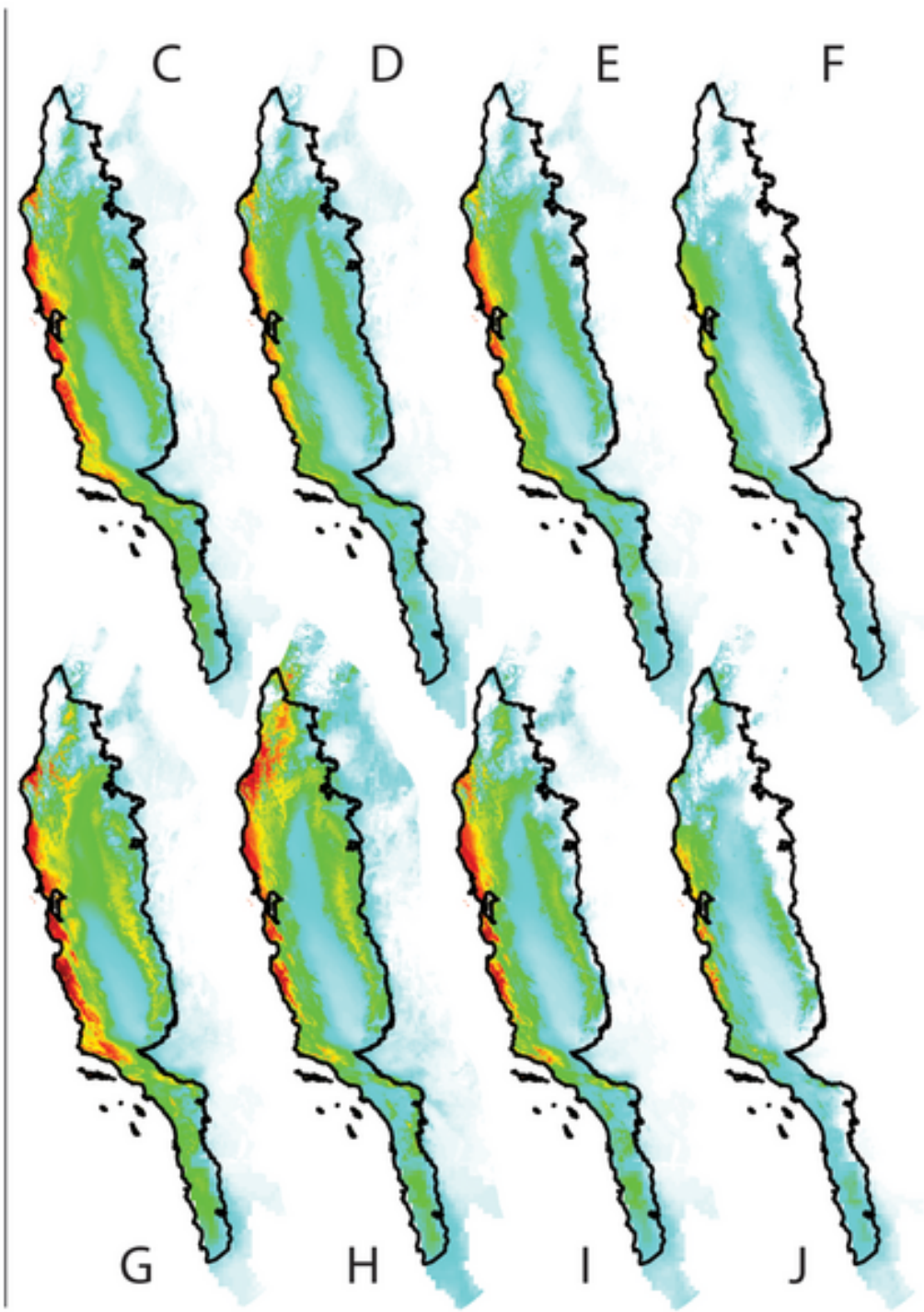
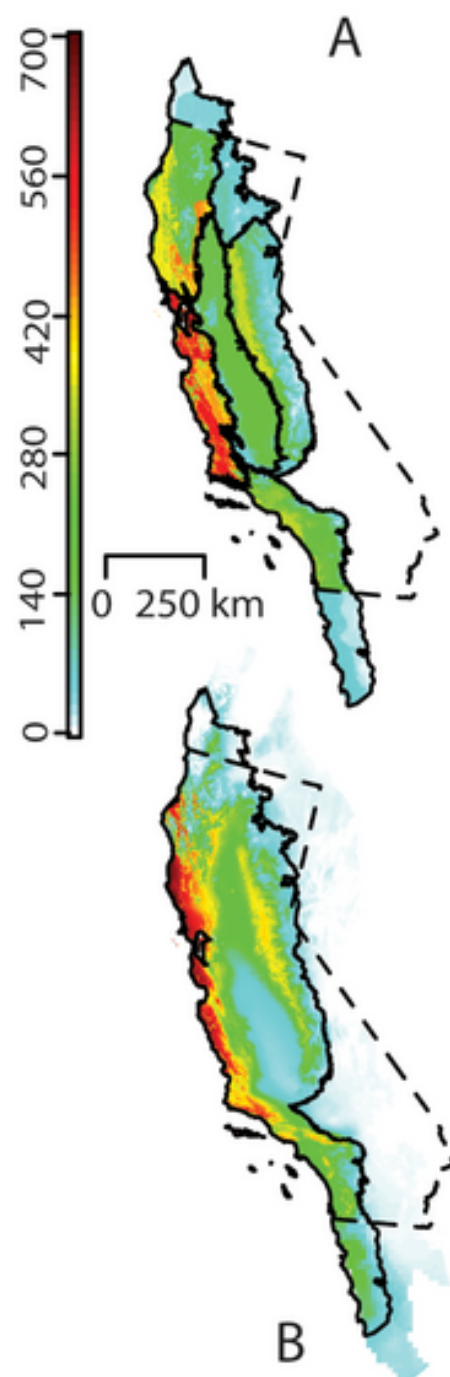
■ Current range ○ Herbarium specimens

■ Future range

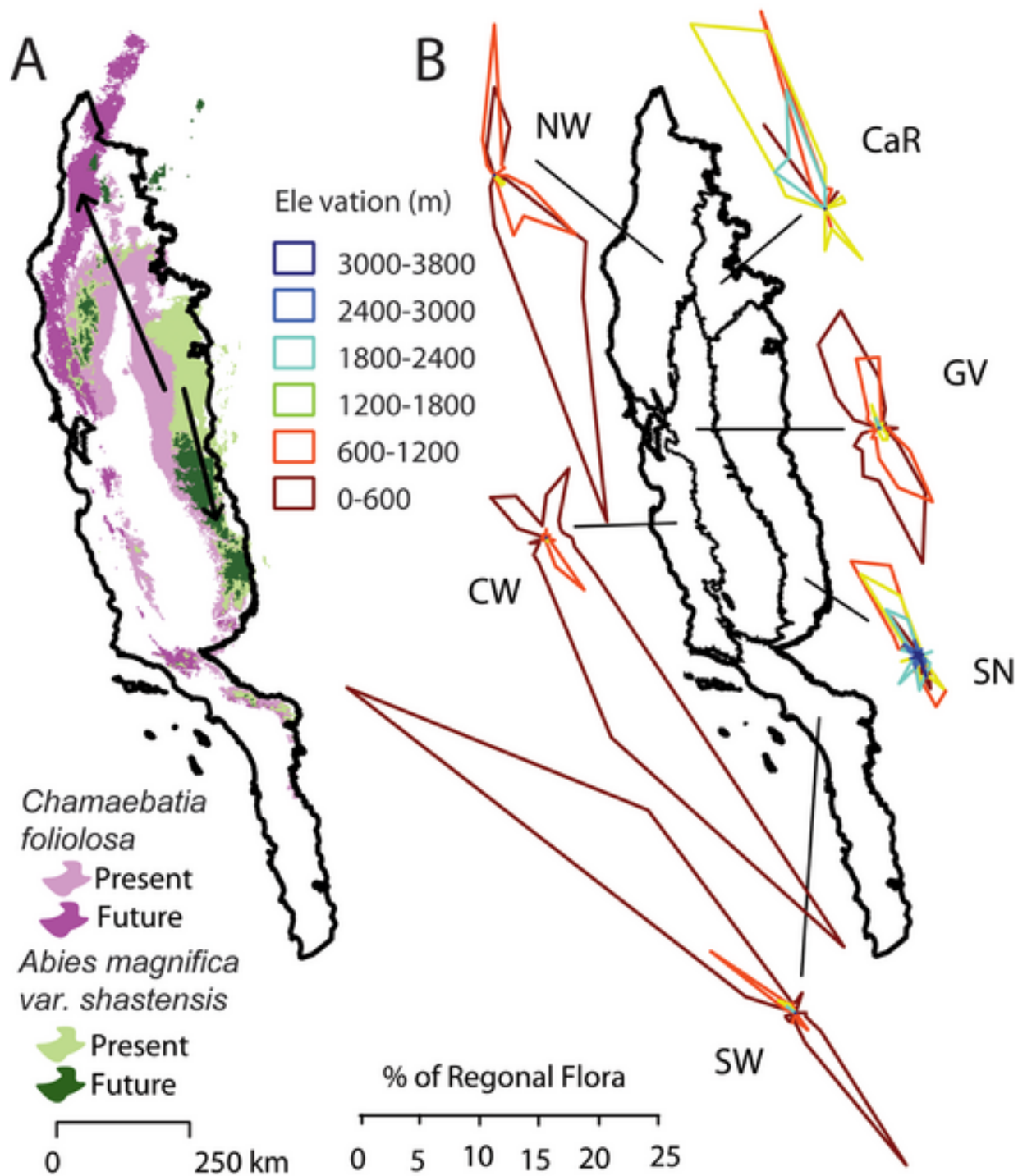
■ Future range (pending dispersal)











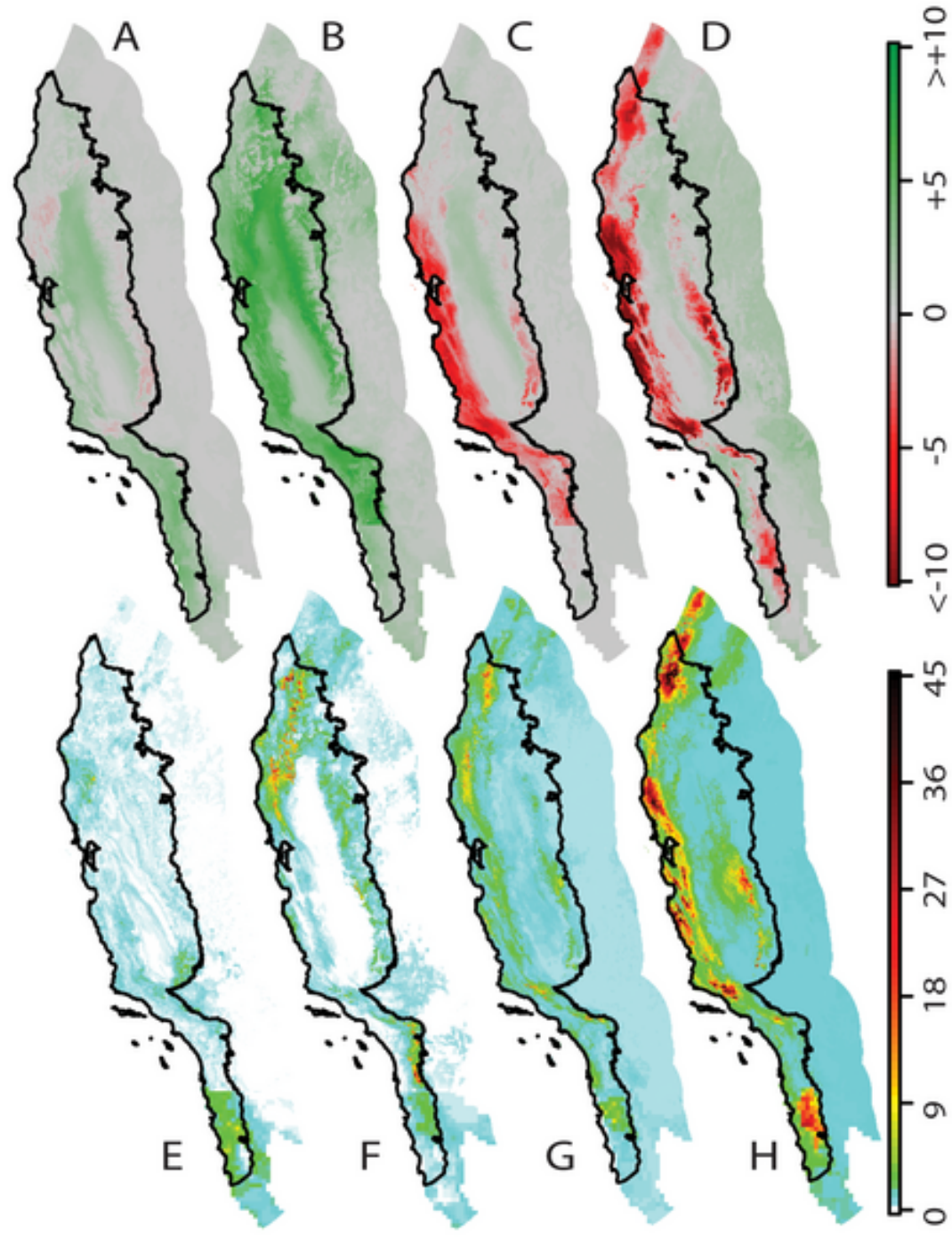






photo by Scott Loarie